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ABSTRACT

This manual is for workshop leaders who want to help educators explore the urban environment with their students and highlights key details distinguishing urban environmental education from environmental education (EE) in other settings. While the examples used emphasize formal education, this is also useful outside the classroom. The unit provides an introduction to EE and discusses student populations and where to conduct urban EE. Three alternative approaches to teaching EE in urban areas are examined. The approaches include: (1) studies of the natural environment; (2) studies of the built environment; and (3) service learning and action projects. Ideas for implementing EE appear in four program case studies and in nine activities for teacher workshops. A "Resources" section offers 29 resources for further information including educational materials, organizations, and literature appropriate for each of the three approaches. (LZ)

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Urban Environmental Education

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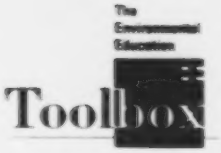

EE Toolbox—
Workshop Resource Manual

Urban Environmental Education

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Introduction

1

THE RED GLOW of a rising winter sun illuminates a group of students huddled along the cement promenade of the East River as they look for signs of life in the murky waters below. Across town, another group is writing letters to the Department of Transportation as a train roars by their school, shaking the rafters and disrupting lessons. Elsewhere, a student, clad in an array of plastics and fabrics, struts down the fashion show runway to the clicks of cameras and the popping of flashes: Every stitch she's wearing was pulled out of the trash. Her social studies class organized the show. These are all examples of environmental education in urban settings, working with residents and focusing on urban issues.

Cities are growing. By the year 2000, half of Earth's six billion humans will be living in cities; in the United States, 90% of the 300 million inhabitants will live in and around urban areas. Our urban lifestyle — condo high rises, elevators, expressways — is rapidly replacing the small-town standbys: corner stores, neighborhood strolls, familiar faces. By some measures, the entire Northeast Corridor, from Boston to Washington, including New York, Philadelphia, and Baltimore, is a single metropolitan area. Yet this region contains a wide variety of landscapes, populations, and land uses. With this shift in demographics, the EE community is beginning to open its eyes to the myriad opportunities available to teachers and learners in cities.

How can we help city teachers integrate environmental issues into their teaching? How can EE practitioners outside the city more successfully reach the urban audience? From EE's origins in nature and conservation education, we have come to see that wherever people interact with their surroundings, from rainforests to civic centers, EE has something to contribute. Urban environments are particularly rich in human diversity; architectural, historical, and cultural interest; and possibilities for exploration of environmental issues such as noise, air, and water pollution. In this unit, we investigate educational resources that convey urban EE to both city teachers unfamiliar with the topic, and educators outside the city who want to reach the urban audience.

What is Urban EE?

Humans are the dominant organism in the city. While all functions that take place in "natural" ecosystems also occur in the city, cities are affected more profoundly by human institutions such as governments, economies, and cultures. The tremendous influence that humans exert on the ecological processes of urban environments makes these areas unique as ecosystems. It also forces educators to rethink the conventions of EE. For example, a lesson on the water cycle in the city would be misleadingly simplistic were it to overlook the centrality of the human-made reservoir and delivery system that brings water into urban homes.

Broadly speaking, urban EE has the same objectives as traditional EE: to encourage awareness, knowledge, attitude formation, skill development, and participation in solving environmental problems. Both traditional and urban environmental educators strive for an environmentally literate citizenry that is willing and able to solve environmental problems. As a teacher educator, you might emphasize to the teachers in your workshops that EE is a process that is fundamentally the same whether it's on a remote mountain top, a suburban field, or an urban street.

The specifics of EE programs vary, however, based on where they are developed and whom they are trying to reach. Urban EE differs from traditional EE because of its context, the diversity of the audience, and the relative abundance of resources available to teachers and learners in an urban setting. Urban EE is unique because it happens in *urban areas*, with *urban people*, and deals with *urban environmental systems and issues*.

In order to define urban EE in the context in which *you* work, you might encourage your workshop participants to define their goals for urban environmental education. With what types of environments do they wish their students would become more familiar? Can they identify solutions to local problems that students could investigate? Which environmental issues can they address? Activity 1 in this unit, and several activities in other units of the *Workshop Resource Manual*, will lead participants toward this discussion (specifically: Is this EE? and Why EE? in "Defining Environmental Education" and Building a Rationale in "Approaching Environmental Issues in the Classroom").

Populations

II

THE INFORMATION BELOW is for environmental educators less familiar with urban schools. There are elements of the students, teachers, and schools that make these systems a little different from suburban or rural schools.

A Picture of Urban Schools

Students

Urban learners are a mixed bunch. They represent nearly every ethnic group, every level of intellectual ability, and every socio-economic stratum. What makes them special is the pace at which they live, the volume and intensity of stimuli they perceive, and often, the disproportionate number from disadvantaged backgrounds. These features result in a precociousness and sophistication unique to the city.

Before they will meaningfully participate in urban EE activities, students must feel that urban EE programs are in some way relevant to their lives. The educator must find ways to connect new material to existing experience or knowledge. Too often, studies of the urban environment have been dictated by voices remote from learners' lives. This results in activities that, though they may appear to have some teaching value, will have little influence on students, who see no connection to their own experience. Teachers should be encouraged to extend themselves beyond mainstream conceptions of urban EE. (See program examples in Section VI and the Activities Section.) Students are inherently aware of their environments and should be tapped as the primary resource in developing a definition for and course of action in urban EE. Teachers who listen to students' interests often find ways to build relevant, meaningful lessons in an EE curriculum. Not all will focus on traditional "environmental" issues, however, as skateboard areas, crime, or child abuse may be their most serious concerns.

Teachers and Schools

Urban teachers, especially at the high school level, are under tremendous pressure to cope with overcrowded classes, apathetic students, absenteeism, students' problems at home, and more. Teachers have inadequate time to prepare for their classes while still adhering to an ever-growing list of state and school mandates. Lack of peer support and administrative attention drives some teachers to a profound sense of alienation from their work.[1]

Many urban school districts serve students from very poor families. In Chicago, 80% of public school children come from impoverished families; in East St. Louis, one third of families earn less than $7,500 per year[2]. Most large cities, which receive large numbers of domestic and international immigrants, are characterized by diverse populations. However, large areas within cities such as Detroit, New York, and Washington, D.C. with predominantly African-American populations, lack cultural diversity.

What does this mean for urban EE? Primarily, it means that teacher educators need to dispel the false trade-off between teaching required subjects and teaching urban EE. Urban EE *can* be effectively infused into the existing curriculum to meet state or district requirements. When working with teachers, workshop leaders should emphasize urban EE's interdisciplinary

Positive Characteristics of Urban Learners

The Urban Learning Framework was developed to underscore the differences, experiences, and strengths that urban students bring to school, presenting these differences in a positive light instead of with the negative labeling that is often applied: that students are lacking scholastic ability, culturally deprived, unmotivated, at risk. This framework emphasizes that:

- Urban students bring to schools cultural strengths and learning experiences that must be reflected in curriculum, instruction, and school routines. Culture (which includes tradition, language, and daily experiences) is a more powerful explanation of differences between student groups than either genetics or socio-economics. Culture also plays a fundamental role in cognitive development, such as helping to modify and mediate intelligence.
- Motivation and effort are as important to learning as are innate abilities. Urban students will benefit from school environments in which they can learn from their mistakes, show effort in their learning, and fully engage themselves.
- Resilience is a characteristic of urban learners. Despite adverse conditions, many urban children grow into healthy, responsible, productive adults. These "resilient" children display characteristics of social competence, autonomy, problem solving, and a sense of the future.[3]

connections to civics, language arts, social studies, and art (see page 11 and Activity 5, page 30) and show teachers how urban EE can contribute to teaching while enriching the experience of the students. (See another unit in the *Workshop Resource Manual*, "Integrating Environmental Education into the School Curriculum.")

At their heart, however, the problems of city schools result from our failure to place school reform inside of a broader vision of social and economic justice and our unwillingness to engage in the kind of political activity necessary to realize that vision. Without such an animating purpose, we are doomed to endlessly discuss the latest piecemeal reform, debate the latest but not central problem, and watch as our public schools are abandoned by people who believe they cannot be saved.[4]

Alex Molnar

There is widespread recognition that something is seriously wrong with U.S. schools. Reform movements have taken hold in the more progressive school districts. Cities including Chicago, Hammond, IN, and Miami have implemented shared decision-making, granting individual schools greater control over budgets, hiring, and curriculum. Students are being given the flexibility to choose from educational alternatives in "controlled choice" systems in Cambridge, MA and Seattle, and in magnet schools in many large cities. And there is increasing pressure to make schools smaller and more personal, to place more of the responsibility for learning on the students, and to focus on issues of relevance to the learners and community. Teachers in many reform-driven programs are allowed more room for creativity as well as time to talk to their colleagues about coordinating curricula and lessons, establishing joint projects, and organizing special programs. These trends are being furthered by groups such as the Coalition for Essential Schools at Brown University, which works in partnership with several hundred schools and a half-dozen states.

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Education reform holds much promise for urban EE. It appears that schools that exemplify effective reform have many things in common with the general approach of EE: Lessons are hands-on, relevant, applied, creative, fun, and participatory. The advancement of the school reform movement in America may prove to be a great boon to urban EE. At the same time, urban EE has the potential to be an important tool for this new direction in education.

Environmental Equity

More attention is now being paid to the inequitable ways in which different populations are affected by environmental hazards. This issue is being addressed by the environmental equity or "environmental justice" movement. While the inequity is not limited to urban areas, many of the people unfairly affected by environmental burdens live in cities. In the siting of undesirable land uses such as incinerators, toxic dumps, chemical plants, and sewage treatment plants, studies find that race and socio-economic status are determining factors. Thus, facilities with strong negative environmental (and health) impacts are more prevalent in poor areas, and among poor areas, environmental impacts are more prevalent in minority communities.[5]

The environmental equity movement gives educators a special opportunity to connect EE with community activities, local leadership, and personally relevant issues. Activists in the movement have identified local issues that deserve broader awareness, attention, investigation, new solutions, negotiation, and resolution.

"The results of our research conclusively show that race has been the most discriminating factor of all those tested in the locations of commercial hazardous waste facilities in the United States."

Dr. Benjamin F. Chavis Jr.

Through environmental equity issues, students will find a vehicle for practicing problem solving skills. Effective educators can link this study with a variety of subject areas: science, math, language arts, social studies, health, art, and so on. See Master 3 for additional ideas.

The issues raised by the environmental justice movement are important to address in a sensitive manner. See the *Workshop Resource Manual* unit "Multicultural Environmental Education" for suggestions for your teacher workshop.

III Where to Conduct Urban EE

TAKING LEARNERS TO NATURAL AREAS can provide opportunities for direct contact with the natural world — and even immersion in it. Participants gain a deeper understanding of the way ecosystems operate and a greater awareness of the processes that sustain all humans on the planet.

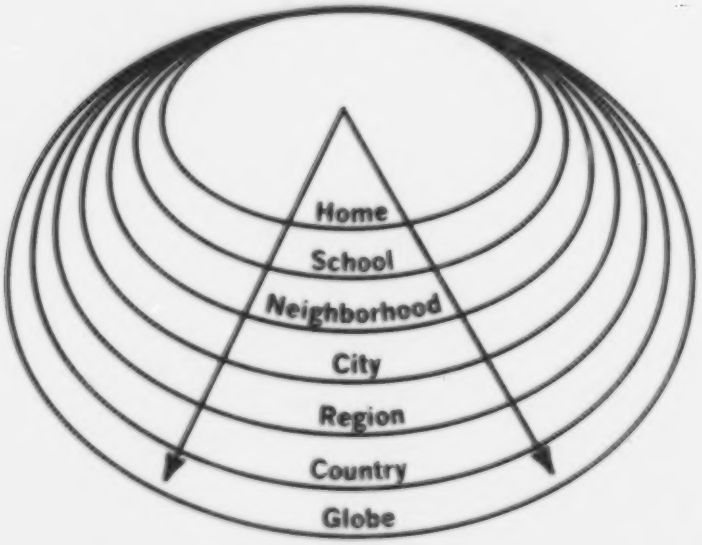
Urban learners, however, don't always have the ability to access natural areas outside the city. And more importantly, bringing learners out of their everyday environments to teach them about "the environment" perpetuates a long-standing anti-urban bias: that large cities are unnatural, unpleasant, and inhumane and that they offer nothing worth teaching about. The implication to urban learners who are taken to rural nature centers is that their own homes and communities are not valid environments and are separate from the otherwise integrated functioning of the planet. At the very least, urban EE programs should strive to start where the audience is, rather than pack them off on field trips to more "edifying" environments.

"A house of snow in the Arctic obeys the same physical laws as one of bamboo in the tropics, and a steel-framed skyscraper is not so far removed from a tree house as we would sometimes believe."[6]

Building an EE Program

Whether you are working with teachers in a workshop or students in a classroom, try building an urban EE program using the concentric circle approach. Start the learner in his or her most immediate environment: the home, school, or community environmental center. This appropriately focuses attention on the environment that the learner can most effectively influence. Then expand the learner's experiences out to the street, neighborhood, city or town, region, nation, and globe in ever-widening circles.

Example of a Concentric Circle Approach



1. While in the "inner circle," explore both the indoor and outdoor environments. Look at the materials the building is made of and the environmental variables that determine the quality of life in the facility, such as:

- heating and cooling system
- drinking water system
- sound levels
- open space
- presence or absence of peeling lead paint
- garbage disposal mechanisms
- quality of indoor air

With all of these topics, a group of students could investigate what goes on, compare one system to another, critique the efficiency or value of the system, and generate alternatives to perceived shortcomings.

2. The surrounding neighborhood can be explored through:

- mapping walking tours on environmental themes in the area
- photography
- studying the art and architecture of the environs
- analyzing the needs of the neighborhood and developing projects to meet those needs

Preparing and implementing needs assessments and other kinds of surveys may be a part of this progression, especially for students above the fourth grade level. (See Activities 3 and 4 in Section VIII).

3. Through action and service projects created by the teacher and students, learners advance to interactions with community institutions. Many possibilities exist, from taking a trip to the area's cultural institutions such as the library and the museum, to asking the community board or town council to investigate and then propose solutions to community problems. The range of issues runs the gamut of the urban environment:

- preserving wetlands and town squares
- labeling street trees
- planting community gardens
- preserving wildlife habitat in a local park
- developing a campaign to motivate parents to get their young children tested for lead poisoning

IV Three Approaches to Urban EE

Even if Urban EE is defined as occurring in urban areas, with urban people, and about urban systems, there are several distinct and valid approaches that are commonly used. The following discussion outlines three avenues that teachers and schools may choose to pursue in their offerings of urban EE.

Studies of the Natural Environment

Currently the dominant approach to urban EE is the study of the natural environment. Cities are not entirely concrete and glass! Many EE programs focus on the abundant flora, fauna, and natural interrelationships that exist in the city. As urban people generally suffer from sensory overload, studies of urban ecology can help them focus their senses to appreciate their surroundings. Studying wildlife at home and outside can be a powerful tool in overcoming negative attitudes toward animals with bad reputations, or areas that seem "worthless."

Teachers and their classes either use the school grounds and surroundings or visit interpretive centers, museums, or parks for tours, special demonstrations, and outdoor experiential activities. In the case of educational facility visits, some teacher training may be required prior to a class visit and the teacher may receive follow-up curricular materials. Developing knowledge of and appreciation for the natural environment is stressed. Some programs involve students in gardening or other outdoor work. An example of a national urban ecology program is VINE, developed by the Denver Audubon Society and now administered through the North American Association for Environmental Education. (See description on page 14.)

The concept of "action for nature" must be incorporated into traditional "nature in the city" EE efforts. Students' experience in a wetland area, for example, should lead to stewardship of that area and stewardship of wetlands in general. Both educating students about the possibilities for action and involving them in direct action projects (direct physical improvement, organizing to stimulate citizen involvement in physical improvement, political action to

Project Pigeon Watch

What kind of bird "wears bell bottoms" and "sequins" around the neck? According to some New York City youngsters involved in Project Pigeon Watch, the common rock dove does! Through a pilot program with the Cornell Laboratory of Ornithology, students tested activities, collected data, and observed local pigeons with great detail. Although these birds are quite common, a great deal is not known about their breeding and feeding behavior. Among the 28 color morphs, for example, are some more aggressive than others? Do pigeons discriminate among color varieties? Do darker birds have any advantage in colder climates?

With the completion of the pilot program, organizers are revising the reference and instruction materials, data forms, and activities for broader distribution. For more information, contact Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, NY 14850 or call 1-800-843-BIRD.

What Can Students do Outdoors in the City?

- Find out how buildings and trees affect local climate. Measure the air temperature on four sides of a building, above a street, and under a tree. (Or sit in these places and feel the differences.)
- Search out the hidden life. Find where the earthworms live; use bait or lights to attract flying insects; use a microscope to investigate soil or water.
- Assess street trees. Inventory which species are used in your area, and evaluate which species grow best, provide the best shade, and so on. Follow up with letters to the city parks department.
- Learn where pigeons roost. Investigate what they eat, and when they mate.
- Examine residential use of outdoor greenery. Observe and ask questions to determine what features of parks are most attractive.
- Stay indoors and investigate cockroaches. You could do this from a pest management perspective, and use traps to assess abundance and distribution.

And more!

preserve and protect a natural area, to name a few) are appropriate for nature-in-the-city programs.

In a workshop, choose activities that will help teachers feel more confident about leading outdoor activities in the urban environment and more skilled at finding vestiges of natural areas. Check out these locations near your workshop or school site:

- school grounds
- cemetery
- front yards
- community gardens
- city parks
- railroad or power line rights-of-way
- atria in large, modern buildings

Manuals and activity guides listed in the Resource Section, provide guidance for instructional activities in these areas, particularly, *City Safaris*, and *Ten Minute Field Trips*.

Studies of the Built Environment

Student awareness of the city's architecture, design, and infrastructure, and the way the urban environment relates to the natural world is the focus of the Built Environment Approach. For example, field trips to a park complement lessons about how open space fits into city design. Students may learn about landscape architecture and then "design" a city block or other urban environment. The American Institute of Architects' Learning by Design Program is one example of a program on built environments.

Several activities presented in Section VIII can assist workshop leaders in helping teachers appreciate the city and its structures. Activity 6 describes an open space beautification process in which teachers and students might engage. Activity 7 helps teachers explore the systems that sustain city life: water, sewer, gas, electricity, and telephone lines that are under the city streets. Activity 8 offers several ways to use a field trip or local hike to discover various patterns and clues about the buildings in your city. And Activity 9 provides exercises which explain the physics of building construction.

What Can Students Learn About the Infrastructure of the City?

- where their energy, food, and water come from
- how their waste is treated and where it goes (solid waste, wastewater, and hazardous waste)
- why buildings look the way they do — for whose needs were they designed?
- how the current city environment is different from that of 50 or 100 years ago
- how the landscape has been managed in the city. Where are the streams that were present before the city was here?
- when various immigrant groups arrived, from where they came, and where they live now
- where the stone for various buildings came from
- why the major industries and businesses are located here

Service Learning and Action Projects

This is an approach that unites environmental awareness and community service/action skills. The underlying philosophy is that the best way to communicate environmental values and learning is to give students opportunities to improve the environment through direct service (e.g., cleanups, open space improvement, or recycling) or community education and political action work (e.g., letter-writing, petitioning, or organizing public symposia).* An example of this type of urban EE is described for the Chicago Academy of Sciences' Ecological Citizenship Program on pages 17 and 18.

Motivated teachers can implement service and action projects in ordinary classrooms. These projects can help inform and enhance formal education. Where teachers integrate such projects into the curriculum and/or the community, great success may be possible. The *Workshop Resource Manual* unit, "Using Community Resources" contains many examples of school projects and ideas for teacher workshops about service and action projects. The service/action approach is also suited to situations outside of formal education. Outside of class, there is less obligation to fit activities into the specific objectives of the established curriculum. Projects may be developed to emphasize practical skills, teamwork, and positive attitudes about public service. These elements are critical for the development of true environmental literacy.

In What Projects Can Urban Students be Involved?

Making improvements directly:
- constructing sturdy, bilingual signs for the city park
- planting and tending community gardens and beautification projects
- constructing fences, walls, bridges, and pathways to make urban parks safer for youngsters

Investigating environmental issues:
- conducting a traffic study and making recommendations for alleviating local problems
- conduct research (surveys, interviews) to identify ways that businesses can conserve and recycle
- research and design literature to inform teachers, students, or the general public about environmental issues

Community action:
- distributing flyers and leaflets on water conservation
- raising money for environmental projects or groups

Whenever possible, students should identify and implement their own projects!

Making Urban EE Relevant

V

THE CONTENT OF AN URBAN EE CURRICULUM might overlap with most of the traditional environmental topics. There are also special topics unique to the urban environment. For specific ideas on these, look at publications such as *Art and the Built Environment: A Teacher's Approach*, or *City Kid's Field Guide* (see Resources). In this section, we consider first how to view the content of EE from an urban student's perspective,[8] and secondly how to integrate that content into the curriculum. For more details of how environmental content areas can be interpreted in an urban context, see Master 3 in Activity 5, Section VIII.

What do Urban Kids Need to Know?

The teachers in your workshop may wonder what urban kids think the important issues are. In informal student surveys, kids frequently list crime, drugs, corruption, racism, littering, and pollution as issues they find relevant.[9] The last two draw immediate attention as typical "environmental" concerns. If we define "environment" as encompassing the complete surroundings in which the learner lives, however, we see that many of the students' concerns are, in fact, environmentally related.

People everywhere, in both urban and non-urban areas, need to learn how to survive in their own environments. Basic survival skills include getting around safely, maintaining health, and understanding the systems that affect one's life. Urban EE can and should play a role in developing:

- familiarity with and affinity for immediate and surrounding neighborhoods
- awareness of support agencies
- understanding of urban power structures and avenues for effecting change

Beyond these, city dwellers need to understand the *urban support systems* that keep them afloat:

- transportation
- solid waste management
- water provision and water pollution control
- energy provision
- food supply
- housing
- open spaces and natural areas

Urban residents also need to understand how their own impacts on those systems both cause and are affected by environmental problems such as:

- indoor and outdoor air pollution
- noise pollution
- water pollution
- solid waste transport and storage
- impacts on the land
- loss of open spaces and natural areas

Finally, and perhaps most importantly, urban learners should grasp the interdependencies between their local environment and the global environment. Specifically, learners should consider the positive and negative role of cities with regard to:

- global climate change
- ozone depletion
- deforestation and desertification
- resource depletion
- loss of species diversity

You can use Activity 1, "What Is Urban EE?" to help teachers identify what *they* mean by urban EE and what they wish to see included in their environmental units. You may also wish to use Master 3 from Activity 5 to assist teachers in identifying the themes and content areas that they could use to enhance their curriculum.

Some teachers may find a unit plan easier to read and understand. The following box provides a concrete example of exactly what students would do each day in a two-week unit on the urban environment.

There are a variety of ways to create urban EE programs, from exercises about the topics listed or semester-long projects, to school-wide festivals or a program for an entire magnet school. Teachers may find examples of urban programs helpful: They describe real people and working projects. The following examples provide four case studies of how educators in several urban areas have developed environmental programs.

Sample Agenda for a Two-Week Unit on the Urban Environment

Session One

Introduction to the urban environment: brainstorm what is "environment" and how do we interact with it in cities.

Session Two

The School (indoor environment):
Examine the materials making up the school building; investigate factors that contribute to the quality of life in the building:

- heating, cooling, and ventilation systems (indoor air quality)
- colors and quality of wall covering (tile, paint, fabric, etc.)
- drinking water, sewage disposal systems
- solid waste disposal
- open spaces
- sound levels

Session Three

The Streetscape (municipal services): Look for evidence of water, sanitation, electricity, gas, transportation, food, retailers, and health services.

Session Four

Open Spaces: Search out and investigate lots, parks, playgrounds, and squares for size, use, location, beauty, and access.

Session Five

Structures: Investigate commercial, residential, industrial, and monumental buildings, their materials, designs, and functions.

Session Six

Natural Elements: Investigate birds, mammals, insects, reptiles and amphibians, trees, shrubs and herbaceous plants (this session could easily stretch over several days).

Session Seven

Topic Selection (refer to matrix in Master 3)
What's important (quality of life: cleanliness, noise, safety, etc.) to you and the community?

Session Eight

Topic Background (refer to matrix)
Provide in-depth knowledge on selected urban topic, e.g. litter, open spaces, and transportation.

***Session Nine**

Skill building, letter writing, arrangements for action project (political, educational, or direct service).

***Session Ten**

Project implementation, or additional planning session.

***Session Eleven (optional)**

Regional and global connections to topic and project, project evaluation, planning; establish continuing subcommittees.

*Note: Sessions nine through eleven may require more than one session and may not necessarily occur on consecutive days.

Urban EE Programs: Four Examples

VI

THE FOLLOWING CASE STUDIES describe four successful programs that approach urban EE from the three perspectives presented in Section IV: "Nature in the City," "The Built Environment," and "Service Learning and Action Projects." These examples may provide you with ideas for your own projects, or with ideas you can share with teachers in a workshop.

The High School for Environmental Studies

AS MENTIONED IN THE "POPULATION" SECTION OF THIS UNIT, urban EE may help link existing school subjects to each other and to the environment. However, teachers traditionally integrate EE with natural science, which has typically formed the basis of environmental studies in cities. Urban EE, however, is a logical focal point for developing interdisciplinary education — if teachers can be shown that EE can tie together the city's natural, built, and social environments. Urban EE can be successfully fused with disciplines beyond science, including civics, social studies, art, English, and foreign languages.

One of the most ambitious attempts to fully integrate environmental concepts into traditional curricula is occurring at the new High School for Environmental Studies, which opened in New York City in September 1992. The school is based on the importance of infusing environmental themes into everyday subjects. Teachers and staff took significant and potentially pioneering actions in the area of environmental infusion in the school's first year. For example, the school required that all students take environmental science in the ninth grade, in addition to the usual physical science course. The environmental science course was itself supported by environmental service and action projects to teach students about issues in the classroom and then act upon them in the community. Projects were directly related to improving the urban environment: monitoring subway and helicopter noise levels, deficient fire hydrants, and water quality in Manhattan's East River; reporting results to the proper agencies; and checking whether needed improvements were made.

Projects were directly related to improving the urban environment: monitoring subway and helicopter noise levels, deficient fire hydrants, and water quality in Manhattan's East River; reporting results to the proper agencies; and checking whether needed improvements were made.

Teachers in other subject areas also incorporated environmental themes into their lessons. In art, for instance, students made journals out of reused and environmentally benign materials. In communication arts or English, they read works of literature from different cultures concerning the significance of nature and caring for the natural world. In global studies, they learned about a myriad of environmental problems and how they are handled in foreign countries. These efforts laid the groundwork for curriculum planning at the school and possibly for EE as a whole. The staff produced a one-week unit on water that is completely interdisciplinary from start to finish; they will produce additional units during the 1993-94 school year.

Approximately half of the 155 High School for Environmental Studies' first-year students performed internships with diverse environmental, community, and governmental organizations. Thus, community service projects emanating from the curriculum were augmented by a work experience in the "real world," which focused on student service to the urban environment. Students did everything from pruning trees to organizing an anti-litter campaign.

For more information, contact: Michael Zamm, Council of the Environment of NYC, 51 Chambers St., Room 228, New York, NY 10007. Telephone (212) 788-7932.

Nature in the City - The VINE Network

A SMALL GROUP OF CHILDREN IN SEATTLE watches in awe as the spider makes its way smoothly across the web, stings its hapless prey, and engulfs the paralyzed mass in a cocoon of silk. Meanwhile, kids in Boston peel back layers of rotting leaves from the edge of the pavement. Some of the small creatures they find are hard and shiny, others dull and glistening; some slither, others crawl or fly, but as each new layer is revealed the kids are amazed to discover how many different organisms live in this tiny, urban habitat. And youngsters in Fort Lauderdale, FL, get a little dirty mixing soil and compost to find out how much organic matter they must add to enrich the sandy soil in their schoolyard.

"Ecological literacy is an essential element of environmental literacy," explained Karen Hollweg of the North American Association for Environmental Education's (NAAEE) VINE Network,[10] "but hands-on ecology education is not available to the huge majority of children growing up in our cities. Given today's constraints, how can we provide these children with the tangible outdoor experiences they need to be able to construct ecological concepts and gain ecological literacy?"

Ecological literacy is an essential element of environmental literacy, but hands-on ecology education is not available to the huge majority of children growing up in our cities...That's where VINE comes in.

The realities of urban schools are striking. Tight budgets in schools and non-profit institutions, coupled with a lack of field trip buses, restricts access to natural areas. Only 5% of elementary teachers teach inquiry-based science, and an even smaller proportion of elementary teachers is trained in field biology. Although environmental professionals are concerned about the lack of ethnic and cultural diversity in the field, the urban schools have difficulty following the formula that suburban schools have used to turn out environmental advocates. Hollweg continued, "We have a great need for creative programs that deal with urban ecological resources, and environmental organizations must improve EE in cities — with an eye toward building a more diverse community of environmental professionals in the next 10 years."

That's where VINE comes in. Volunteer-led Investigations of Neighborhood Ecology is a network of projects in 12 American cities. Each city's project relies on trained volunteers to lead city-based, ecological activities with kids ages 8-12. In some cities, high school students serve as volunteer leaders; in others, parents or community volunteers fill that role. Training workshops give leaders experience in conducting investigations and using the nets, strainers, magnifying lenses, and other investigative equipment supplied to their group. The volunteer-led investigations may take place in schoolyards, or in any other part of the urban environment. Each project volunteer works with a group of six children, returning to the same school or after-school site an average of four or five times to work with the same group.

The VINE Network began under Denver Audubon Society sponsorship. Now, VINE is a new program of the NAAEE. It is run by Hollweg, who directed the development of Denver Audubon Society's model Urban Education Project from 1984 to 1988. "When we started Denver's project," said Hollweg, "we had no idea it would grow like this. It's exciting to see the way different cities have adapted our original idea, crafting programs that work for their area. Teachers say these experiences 'bring alive their textbooks and classroom lessons,' and youth group leaders claim 'it opens up a whole new world and way of perceiving' for their youngsters."

She continued, "The 1990 U.S. Census says that in most American cities, about one third of the children live at or below the poverty level. Each VINE program is committed to reaching an audience that mirrors the demographics of its city's schools. In 1991-92, for example, VINE programs involved more than 7,000 children, 39% living below poverty level, 39% minorities, through the efforts of 900 trained volunteers."

The VINE Network is structured so that project directors from different cities share ideas and learn from one another, collaborate on projects that are too big for any one city to tackle on its own, and help new cities start projects. In an initiative funded by the National Science Foundation, the Network is developing two videotapes to publicize the programs and train volunteers, assembling a kit of publications to help new programs get started in more cities, and undertaking an evaluation study in conjunction with the projects in Denver, Seattle, and Fort Lauderdale.

For more information, contact NAAEE-VINE Network, Karen Hollweg, 1255 23rd Street NW, Suite 400, Washington, D.C. 20037. Telephone (202) 884-8912.

The Built Environment – City Science Workshop

DURING A RECENT SUMMER IN NEW YORK CITY, science investigators were engaged in a number of important research projects: One team of investigators, bearing an uncanny resemblance to a group of tourists, craned their necks to admire and photograph historic buildings in Harlem. Another team was in a nearby courtyard, laughing as they flew their model gliders across the open space. A third team of dedicated investigators was seen riding different buses around the neighborhood, chatting with other bus passengers.

These science investigations took place as part of the City Science Workshop, a three-year, National Science Foundation-funded project of the City College Schools of Engineering, Education and Architecture. The workshop is designed to help teachers devise methods of teaching elementary science using the urban environment as the source of materials for study. In this summer workshop, classroom teachers developed their abilities as science inquirers by planning and implementing investigations of the urban environment. With the support of project staff and City College students, they would later involve their own students in similar investigations during the academic year.

The focus for this workshop was the "designed" environment: those aspects of the immediate environment which were conceived and constructed by humans. The goals were to help teachers identify issues from the built environment which could be the basis for classroom investigations, and to stimulate participating teachers to plan and implement their own investigations.

The workshop was attended by 29 teachers and 20 undergraduate City College students. Drawn from the disciplines of architecture, computer science, electrical engineering, film, international studies, physics, and technology, the students represented a broad spectrum of ethnic and cultural diversity. Fifteen of the students were later chosen to serve as teaching assistants, and each was assigned to provide support to a participating teacher in her or his classroom.

There were two major objectives for the first week: to encourage the participants to reflect upon and express their own views about science and science education; and to involve them in a series of brief, structured-inquiry activities. The activities addressed three

aspects of the built environment: 1) representation of the environment through mapping and other graphic means, with activities including a treasure hunt and other mapping exercises; 2) the characteristics of materials and structures, with activities such as observations of real bridges, and building model bridges from paper, straws, and other everyday materials; 3) the thermal properties of buildings and other vessels, with activities such as a contest to design the best and worst thermally insulating containers. Before and after each activity, project staff members led discussions on pertinent physics and mathematics concepts.

The second week began with an animated discussion of a paper that expresses the goals and method of the project: "Statement on Environmental Education," by David Hawkins.[11] Most of the participants recognized that the viewpoint of the paper and the project imply a major overhaul of science education. Teachers were also asked to present their own "science autobiographies." In the ensuing discussion, many came to realize that their own avoidance of science stemmed from inadequate preparation in science education.

The workshop is designed to help teachers devise methods of teaching elementary science using the urban environment as the source of materials for study.

The bulk of the second week, however, was taken up by the aforementioned individual and small group investigations. The group that explored the architecture of historic buildings in Harlem developed underlying scientific principles of construction. The group with the model gliders used videotape to study the mechanisms of bird flight, and applied the principles to the design of their gliders. The investigators on the bus were studying city bus service and ridership. Still other group projects included: photographing nearby bridges and trying to replicate them using common materials; recording and cataloguing the sounds heard within a two-block radius of the college campus; measuring the ebb and flow of garbage accumulation on a nearby street; and gathering extensive data about the use of a campus quadrangle by students and other passersby. Throughout these investigations, project staff consulted with each group on the design of their investigation, the organization of data, and presentation of the results. The week culminated with each group preparing graphical summaries of the data and making oral presentations to the entire workshop.

During the third week, between 30 and 40 children were present each morning. The teachers divided themselves into nine groups, according to areas of interest, and each group worked with a small number of children to develop and implement investigations. Of the nine groups, five designed and built model structures in the classroom, one explored historic buildings in the vicinity, and three chose topics from the nearby natural environment: insects, birds, and trees. Each afternoon, there was a review of the morning activities, and topics of general interest. There also were teacher-led discussions on multicultural education, planning investigations, and alternative assessment. At the end of the week, each group of children was asked to prepare and deliver a presentation on its investigation. The workshop concluded with the teachers' evaluation of the three-week experience.

The summer workshop met many of its goals. By the end of the three-week period, nearly all of the teachers felt a strong sense of identification with the project, and looked forward to implementing project activities in their own classrooms in the fall. Nearly all of the participants found it very stimulating to become science inquirers and support children's investigations. One expressed that her investigation of bridges had been among the most exciting experiences of her life. Most of the teachers clearly understood the difference between science inquiry and traditional school science, and responded favorably to the empowering potential of the former. The summer workshop was a definite success in changing the attitudes of participants about the goals and methods of science education.

For more information contact City Science Workshop, Gary Benenson, project director, Mechanical Engineering, City College of New York, New York, NY 10031. Telephone (212) 650-5994; e-mail:benenson@me-mail.engr.ccny.cuny.edu.

Service/Action Approach - Ecological Citizenship

ENVIRONMENTAL EDUCATION IS A PROCESS that leads to responsible individual and group actions. Action is the goal of the Ecological Citizenship program — action by principals to support their staff with resources to teach EE, action by teachers to teach it, action by parents to support their child's learning, and action by students and the entire community to take control of their local environment.

EcoCit is a multidisciplinary, K- 8 program designed to meet the need of urban students and teachers for EE. Students develop skills in a framework that employs process-oriented, hands-on inquiry activities in a cooperative group setting. The program covers a wide range of issues and topics such as "Greening the Neighborhood," "Living Lightly in Your Neighborhood," and "Precious Water," which help students start local action projects of their own. Student action culminated recently in an "Eco Fair" organized by the elementary students in conjunction with Malcolm X Community College. The kids set up 50 tables, displaying actions they'd taken for the environment in the previous year. The actions ranged from site beautification and in-school recycling, to developing native plant areas and conducting letter-writing campaigns. One thousand people attended the fair, which featured student-arranged entertainment.

Unfortunately, teachers often lack confidence in their ability to teach EE. The primary goal of EcoCit, therefore, is to empower teachers to extend the teaching of environmental science, and to improve the effectiveness of environmental science instruction. Toward this end, the program makes use of a variety of strategies to support the urban teacher in integrating EE into the curriculum: inservice workshops, in-classroom coaching, access to resources and graduate courses, and frequent support meetings.

At the beginning of each semester, EcoCit teachers participate in a three or four-hour inservice program that provides an overview of the program and gives teachers practice with some of the activities and experiments. During the semester, EcoCit instructors work with teachers in their classrooms, modeling hands-on/minds-on teaching, classroom management techniques, group learning strategies, and performance-based evaluation methods. EcoCit provides teachers with samples of free instructional materials, and shows them how to gain access to other, inexpensive resources. EcoCit teachers can also receive graduate-level credit through the "Environmental Issues Forum," a separate enhancement program that gives EcoCit teachers priority in course registration.

The actions ranged from site beautification and in-school recycling, to developing native plant areas and conducting letter-writing campaigns.

"Coffee meetings" are held periodically with participating teachers and their principals to share experiences and create an overall atmosphere of support. Teachers and students review program activities to assure that they are "user friendly," and that they are meeting real needs. In addition, each participating teacher receives a membership to the Chicago Academy of Science, thereby gaining access to the academy's resources and educational programs, and to programs offered through the numerous environmental organizations affiliated with the academy.

Brown School typifies the urban under-served school, and provides a good example of what EcoCit can do. The school sits in a sea of asphalt, on a parking lot between Chicago Stadium and the Chicago Housing Authority's Henry Horner Development. Busy streets surround the school, and the tracks of the noisy "El" train run past its east side. Virtually all the children at Brown are low-income, with 99% of them participating in the government lunch program. The student population is 97% African-American, 2% Hispanic, and 1% Caucasian.

Working with Brown School presented a unique challenge for the EcoCit staff. It was immediately clear that more frequent support meetings with teachers and administrators would be needed. Whereas at other schools meetings averaged one or two a month, Brown required up to 12 each month. Initially, many teachers saw the program as just another fad, something extra that would add to their workload; fortunately, a few teachers were willing to try.

As the year progressed, a core group of enthusiastic believers emerged — teachers who, with their students, had become actively involved in the program. At breakfast meetings, these teachers began to share with others the work their students were doing. Gradually, the less enthusiastic became infected with their feelings of excitement, pride, and empowerment.

A very successful action project was developed and carried out by Ms. Keros' eighth grade class at Brown School. The students decided to paint five rusty, graffiti-covered dumpsters. They began by soliciting donations, receiving paint from the city's "Give Graffiti the Brush" program, work gloves from a nearby builder's supply store, and brushes from another local store. On a sunny day in May, the students scraped and painted the dumpsters. "At our school, some of the kids don't have any respect for people, because people don't show them a whole lot of respect," said Ms. Keros. "But when we were painting the dumpsters, people came by to take pictures and tell them how much they appreciated what they were doing. It gave the students a real sense of pride."

For more information, contact Carol Fialkowski at Chicago Academy of Sciences, 2001 N. Clark, Chicago, IL 60614. Telephone (312) 549-0606, ext. 2028.

Ideas for Teaching Teachers

VII

SO, YOU WANT TO CONDUCT AN ENVIRONMENTAL EDUCATION WORKSHOP for urban teachers? Much of the information in this unit will prepare you for ways of thinking about urban EE differently from "other" EE. The examples of what teachers do in the classroom, suggestions for issues to investigate, and the program descriptions of several major efforts can bring the urban reality to your workshop. Here are some additional reminders as you develop your workshop agenda:

Urban EE can mean a variety of things to teachers. Do you know what your teachers think it is? You might talk to them prior to the workshop, or build time into your agenda to have them discuss the wherefores and whys of urban EE. Consider using Activity 8 on page 40 to organize a field trip.

How well do you know the city? You might co-facilitate with an architect, urban planner, or urban environmentalist to help provide some solid content about this urban environment.

Is this your first foray into Urban EE? Consider using a few friends or developing an "advisory committee" to give you some honest feedback about your agenda and your ideas about urban EE in general. Or, you might look for co-facilitators among the schools with which you are working. This could help build your confidence as well as your credibility, not to mention steer you away from little mistakes.

Many urban regions have experimental educational programs and strong advocates for education reform. These groups might be timely allies for urban EE. You are offering real-world, interactive, issue-oriented, relevant, exciting curriculum ideas, and that is often what they are working toward. You might team up on a workshop or two.

Many EE workshop facilitators rely heavily on activities to energize their workshops and give teachers good experience with the new materials. As you choose the activities for your urban workshop, think carefully about *where* the schools are located (do they have trees nearby?) and *who* attends the school (can students bring extra things from home?). Few things are more discouraging than learning that teachers believe an activity you conducted would never work in their classroom because it wasn't designed for an urban audience. If you aren't sure, involve your teachers in an activity to adapt materials to their setting (as in Activity 2, page 25).

Find out what teachers need to feel confident with urban EE. Consider guest speakers and field trips to provide expertise. A visit to the water treatment facility, the metro transit garage, the recycling center, an historic building, or even the grocery store can help participants understand more about how their city functions and how they interact with their environment. Activities 3, 5, 6, and 8 in Section VIII provide some ideas for field trips and workshops.

Give teachers time to discuss how your information and materials fit into their curriculum. You might use Activity 5, page 30, as a guide to help them think about connections between what they teach and the urban environment. Master 3 could be used without the activity. "Integrating Environmental Education into the School Curriculum," a unit in the *Workshop Resource Manual*, provides a variety (though not urban-specific) of workshop ideas.

If you are lucky enough to work with a group of educators who are charged with designing an EE curriculum for their urban school, you might help them begin by defining what they mean by EE (Activity 1), and their goals for the curriculum. The *Workshop Resource Manual* unit, "Defining Environmental Education" offers additional suggestions. Then help them identify resources they might tap in their community. "Using Community Resources" (also in the *Workshop Resource Manual*) is an ideal source for this task. Use the concentric circle approach on page 7 to design the curriculum, moving from the school to the street and out to the city.

Summary

This unit provides you with an orientation to urban EE: the issues, the opportunities, and the challenge. In general, environmental education in the city is geared to the same goals as it is in the wilderness. However, EE (or any kind of education) is always more effective if it builds on the learners' interests and experiences, and those will vary between Glacier National Park and downtown St. Louis. Almost any curriculum that non-urban teachers use can be adapted and used in city schools. And almost any environmental topic has an urban equivalent. In the next section, we offer a collection of workshop activities that will help facilitators tap urban teachers' interests and adapt EE to their particular urban environment. Feel free to adapt them to your city, your teachers, and your curriculum constraints.

Workshop Activities and Masters

VIII

THE NINE ACTIVITIES IN THIS SECTION offer starting points for EE inservice programs in urban areas. Of course, in most cases, inservice programs will have a content focus beyond "urban EE." Your primary goal will be to help teachers create lessons or programs dealing with water quality, recycling, or ecology, for example. The activities in this section will increase teachers' awareness of the unique possibilities for EE in the city.

1 What Is Urban EE?

A brief introductory activity where participants decide how they wish to define urban environmental issues. Appropriate for elementary to high school.

2 Adapting EE Materials

A format for helping teachers utilize non-urban EE materials by strategically adapting these activities to the urban setting. For all teachers.

3 Assessing Community Needs

An open discussion about techniques for identifying environmental issues in a community. For middle school to high school teachers, and non-formal settings.

4 Investigating Services Around Your School

Human life in cities is supported by a variety of services (e.g., energy, water, food, sanitation, protection) offered by municipal government or private enterprise. This activity helps increase participants' awareness of those services and their quality and includes one handout master. Appropriate for upper elementary and older.

5 Teaching About the City Around You

Opportunities to connect urban environmental issues to the curriculum abound, once teachers are introduced to ways to look for them. In this activity, teachers will work in groups to make some of those curricular connections. Includes two handouts: a worksheet, and the Urban EE Matrix. Appropriate for middle school and older levels.

6 Beautifying and Preserving Open Space

Open spaces offer many benefits to students and residents of urban areas. In this activity, teachers explore the open spaces in their communities and discuss projects students could conduct to enhance them.

7 City Six Bits

An activity that challenges groups to cooperatively draw the cross section of a city street – under the ground. Information about water and sewer mains, and electric, gas, and phone cables is included on the Six Bit cards.

8 Tour de Buildings

Guidelines for a field trip through the city and seeing the major features of the landscape. For all grade levels.

9 Why Buildings Stand Up

A series of challenges and investigations to understand the physics of construction. Appropriate for elementary and middle school.

Activity 1

What Is Urban EE?

A brief introductory game/discussion where participants decide how they wish to define urban EE. Appropriate for elementary to high school.

Objective

To help teachers develop a personal definition of urban EE; to encourage awareness of the interconnectedness of "environmental" and other social issues.

Materials

Cards, adhesive tape, Master 1

Time

90 minutes

There is no agreement on exactly what urban EE should involve. While the objectives and process of urban EE are the same as traditional EE, some practitioners exclude certain ambiguous or controversial issues, such as homelessness or crime, while embracing others. Ultimately, it's important for the individual teacher (or school or district) to develop a personal concept of urban EE and the issues under the urban EE heading.

Outline

Before starting, choose several words from each column below (or choose issues that you consider relevant for your audience). Write them in large letters on paper cards.

"Traditional" Environmental Issues	Issues Accepted in Both Categories	Key Urban Issues
Energy Conservation	Solid Waste	Housing
Rainforest Protection	Open Space	Poverty
Wetlands Preservation	Water Quality	Drug Abuse
Global Climate Change	Air Pollution	Transportation
Biodiversity		Crime
		Racism
		Economic Development
		Hunger
		AIDS

2

Ask the group to consider the question:

"In this city, what issues would you include in a unit on the environment?"

3

Have one person at a time stand in front of the group, with a word-card taped to their shirt (on their back if you think they'll peek) so that the group can see it but the individual cannot.

4

Without saying what the word is, participants should discuss:

a) who is affected by the issue;

b) where the issue occurs; and

c) why it is (or isn't) an urban environmental issue.

Meanwhile, the person standing in front of the group may attempt to guess the word. They can declare their guess at any time, but the discussion should carry on nonetheless. The facilitator should take notes on participants' contributions.

5

List common traits participants deemed "urban environmental." Why did they see some issues as being urban environmental while others were not?

For those issues that may not be considered environmental, you may want to point out (if participants haven't) certain relationships. For example, note that a good public transportation system may help reduce unemployment while minimizing harm to global climate.

6

Ask what distinguishes urban EE from traditional EE. It may be helpful to categorize ideas into:

a) populations involved;

b) physical settings; and

c) nature of issue.

Advise teachers that they don't need to reach agreement on this question.

7

Use Master 1 to help identify three different approaches to urban EE. Are they all valid or desirable in your school?

Master 1

Major Approaches in Urban EE

Studies of the Natural Environment

Use green spaces and natural areas in urban locales to develop knowledge of and appreciation for the natural environment

Studies of the Built Environment

Emphasize how the environment is influenced by humans, including the city's architecture, design, and infrastructure

Service Learning and Action Projects

Unite environmental awareness and citizenship skills

Activity 2

Adapting EE Materials

A format for helping teachers utilize non-urban EE materials by strategically adapting these activities to the urban setting for all teachers

Objective

To help participants alter traditional EE activities to suit their situation and environment.

Materials

Several traditional EE activity guides (such as Project WILD, Project Learning Tree, NatureScope), or copies of typical activities.

Time

30–60 minutes

Most EE instructional materials available to teachers were not written with urban schools in mind. To help teachers utilize these materials, this activity will help participants "urbanize" EE curricula.

Outline

1

Distribute EE activities to groups of 4–6 teachers, so that each group has a different set of materials to review. Ask each group to skim through the activity and imagine conducting it with their students. What problems or concerns will they have? Give each group 15 minutes to identify potential problems.

2

Ask a reporter from each group to make a checklist of the group's concerns, such that the concern might be applied to other activities. For example, they should try to re-phrase an observation such as "My school does not have trees on the property," to read "Does the activity require trees or other natural features at the school site?"

3

Create a master list from all the contributions and ask participants to imagine how they might resolve these concerns and still accomplish the objectives of the activity. No doubt some activities will not be possible to modify, but others certainly are.

Optional extension

Ask each group to work on a different activity, and this time, apply the entire checklist to modify the activity. Encourage them to be creative and thorough in their adaptation. Give them 20 minutes to work, and then ask groups to explain their new activities to the entire class.

Sample Checklist Items

- ✓ Are the materials needed for this activity available in your area?
- ✓ Does your school have a suitable location for this activity? (An outdoor area? A grassy field? A clean pond?)
- ✓ Are the graphics and illustrations appropriate for your students? (Are students of color pictured?)
- ✓ Are the examples relevant to your students? (Cougars and eagles or cockroaches and pigeons?)
- ✓ If the activity asks students to bring items from home, are these readily available? (If not, could the activity be done as a demonstration?)
- ✓ Does the activity assume a certain level of affluence?
- ✓ Does the activity make assumptions about what students know or how they behave?

Activity 3

Assessing Community Needs

An open discussion about techniques for identifying environmental issues in a community. For middle school to high school, and non-formal settings.

Objective

To learn a variety of techniques to assess environmental problems in the community

Time

45 minutes plus optional extension

Teachers and students have a sense of the environmental needs and problems of their community. While this activity does not lead teachers all the way through project implementation, it does help teachers become familiar with a process for selecting issues with the students. The resources listed at the end of this unit will provide direction on how to proceed.

Outline

1

Explain that this workshop will explore the question: "If you were to set your textbooks aside and address an environmental issue that really matters in a community, how would you investigate your options? Whom would you rely on to tell you what issues matter?"

2

Record the ideas teachers generate. They may say:

- have students ask their parents
- have student teams review newspaper articles or editorials
- make observations and collect data
- conduct informal discussions and interviews with friends, community residents, store owners, and others
- invite store owners, community board members, or leaders of civic groups to answer questions individually or attend a meeting
- investigate census data, planning board fact sheets and guide books
- conduct a survey of the community

3

What factors should be considered in choosing one of these methods? For example:

- time required for project development
- resources available to organizing group
- size of the class, and their interest and commitment to doing this project
- surveys and studies that have already been done and are available

4

Ask the participants to select one of these strategies they want to explore. Then ask for volunteers to role-play an interview between a student and a community official or store owner to begin to understand what skills students need to develop and what they might expect as they move into the community to work on environmental issues. Ask the participants to help the actors if they get stuck.

You may find the two *Workshop Resource Manual* units very helpful: "Approaching Issues in the Classroom" and "Using Community Resources."

5

Optional Extension

Implement the strategy. Develop the methods decided upon earlier (e.g., draft the survey, take a walk with the teachers to observe the local environment, develop an interview or questionnaire format.) As time permits, go out with participants into the community to collect data on community needs. Conduct interviews, administer questionnaires. Return, or stay outside, and analyze the results of your initial assessment. What appear to be the areas of greatest need in this community? How do these results compare with what teachers would anticipate at home?

Follow-up

Discuss solutions to the problem identified by the group. Brainstorm approaches to implementing an action plan.

Note

Your community may have some materials or studies that identify local concerns and the plans to resolve them. After asking around city government or regional planning offices, you might discover some important resources that teachers could use.

Used with permission and adapted from *Training Student Organizers Curriculum*. Michael Zamm, Robert Ortner, Beverly DeAngelis. Council on the Environment of New York City. 1990, pp. 190-192.

Activity 4

Investigating Services Around Your School

Human life in cities is supported by a variety of services (e.g., energy, water, food, sanitation, protection) offered by municipal government or private enterprise. This activity helps increase participants' awareness of those services and their quality. Appropriate for upper elementary and older.

Objective

Participants will become familiar with what's working and what's not in their local environmental services.

Materials

Worksheet for each person from Master 2, pencil or pen, blackboard or newsprint

Time

45 minutes

Outline

1

Begin by asking participants what type of services they use in the urban area. Write these on newsprint or blackboard. Do they utilize these services in different ways from day to day?

2

Hand out the worksheet from Master 2, one per participant. Discuss the services listed on the sheet, and add any others that participants feel are missing. Go through the Sanitation/Litter example, clarifying what is meant by the term "adequate" in the fourth column.

3

Explain that they don't need to find examples for every category, though they shouldn't be too hard to find. Rather, the participants should broadly scan the outdoor environment and anything their eyes settle on should fit into one of the service categories.

4

Go outdoors and place participants in groups of two or three, each in a different nearby location. Encourage participants to share information and observations. Allow about 15 minutes for recording observations.

5

Gather participants into a group and discuss their findings. Ask for examples from each of the service categories. Did they find any items that fit into two or more categories? Were there any items that participants didn't know where to place?

6

Participants should circle those service items they found to be inadequate. Ask them which services are circled and why. What could a group of students do to help resolve this apparent "problem"?

Note

The curriculum materials *E.2: Environment and Education* (formerly Earth Time Project) offer guidance for students exploring identified inadequacies in their school environment. This resource (see page 46) may provide an appropriate extension to this basic survey.

Master 2 Investigating Services Around School

List the items connected with city services you observe in the area right around your building. For example:

Type of Service	Item (object)	How Many	Is the Service Adequate? Y/N	Why or Why Not?
Sanitation/Litter	Litter Basket Trash Dumpster Etc	4 2	No Yes	Litter all over the place Enough space for garbage

Type of Service	Item (object)	How Many	Is Service Adequate?	Why or Why Not?
Safety				
Communication				
Transportation				
Water				
Food				
Sanitation/Litter				
Housing				
Open Space (trees, art, etc.)				
Energy				
Other _____				

Activity 5

Teaching About the City Around You

Opportunities to connect urban environmental issues to the curriculum abound, once teachers are introduced to ways to look for them. In this activity, teachers will work in groups to make some of those curricular connections. Appropriate for middle school and older levels.

Objective

To build teachers' skill in identifying opportunities in their curriculum for addressing urban environmental issues.

Materials

Copies of Urban EE Matrix (Master 3) and Teaching Scenarios (Master 4) for each participant

Time

45 minutes

Outline

1

Divide the participants into groups of four, and ask each group to choose a facilitator, recorder, reporter, and timekeeper. If necessary, explain the roles for each person: facilitator keeps the discussion moving; recorder notes major decisions and ideas; reporter prepares to explain the results to the whole group; timekeeper keeps the group focused on the task and warns them as the time runs out.

2

Distribute the Urban EE Matrix (Master 3) to each participant and quickly review it. Point out that major urban environmental topics are listed on the left column, and across the page additional information is provided. In the right column some of the subject areas that form a ready link to this topic are listed.

3

Distribute a set of four different teaching scenarios to each group. One of the scenarios should be filled out as an example of what you're looking for. Ask them to respond to the questions, and to discuss how they might actually incorporate the idea presented into their current teaching. They can use the matrix to give them ideas, and they can add to the matrix. They have 30 minutes to review all of the scenarios. (Alternatively, you could assign each scenario to a different group and give them 8 minutes.)

4

Ask the reporter from each group to summarize only a portion of their ideas for each scenario, perhaps the environmental twist, the action potential, or the content connections, depending upon the way your workshop is moving and the skills your group needs to develop.

5

Use some of these questions to guide the discussion that follows:

- Which subject areas could most easily adopt an urban environmental theme?
- What community resources might be available to assist teachers with these topics?
- How might other subject areas develop an environmental slant: driver's education? home economics? technology? general science?
- What issues are particularly relevant in your community?
- What organizations are currently working on them?

Master 3

Urban EE Matrix

Topic	Urban Relevance	Environmental Impact	Trip/Study Opportunities	Action Potential	Content Connections
Transportation	Complex multi modal transportation systems allow movement of goods and large numbers of people.	Over dependence on personal transportation at the expense of public transportation has worsened air quality and reduced living space in most U.S. urban areas; demand for oil drives international politics.	Department of Health air quality monitoring stations; motor vehicle emissions inspection stations; office of local transportation planner.	Awareness campaign on environmental impacts of cars; political campaign to divert government funds to public transportation; awards for car dealers who specialize in fuel efficient vehicles; promotion of carpooling among teachers and staff.	Land use, air pollution, energy, noise, environmental health.
Water	Surface and/or groundwater infrastructures allow urban populations to survive where local water supplies might be inadequate; sewage treatment speeds up natural purification process; many industries locate along waterways.	Increasing demand for water raises supply concerns; increased pressure on sewage treatment plants results in inferior pollution control; population expansion and poor land use practices threaten purity of water supplies.	Reservoir; pumping station; valve chambers; pollution control facilities (sewage plant); sludge composting facility; local water source (study water quality indicators).	Water conservation campaign; storm sewer drain stenciling ("Dump no waste-drains to river"); political campaign to protect watersheds; fire hydrant monitoring for leaks.	Land use, environmental health.
Air	Air in cities is usually poorer than in non urban areas; urban residents suffer from higher incidences of respiratory and related illnesses; indoor air quality concerns people who spend much time indoors (lack of ventilation; ground level ozone from copiers).	While overall U.S. air quality has improved since 1970's, increased dependence on passenger cars has increased automobile related emissions; increased electric demand has similar effect; new awareness of air toxins causes greater health concern; cities may be big contributors to global climate change.	Visit local hospital pulmonary unit or lung association; do "life cycle analysis" or various energy demanding mechanisms and energy sources. (See also trips in "Transportation").	Education campaign on the threat of ground level ozone; air monitoring project; political campaign to limit indoor cigarette smoking; awareness campaign to increase use of mass transit or other alternatives.	Transportation, energy, environmental health, solid waste.
Energy	Urban people depend on external sources of energy (usually fossil fuel or nuclear) to meet their transportation, industrial, commercial, and residential needs; densely populated urban areas tend toward greater home energy efficiency and public transport opportunities.	Burning fossil fuels contributes to local and regional air pollution, and possibly to global climate change; fossil fuel extraction may contaminate wild landscapes; disposal of spent nuclear fuel is still an impermanent and risky endeavor.	Electricity generating facilities, natural gas storage facilities, energy museums, exhibits, and institutes.	School lighting conservation projects; home energy conservation; political/educational campaign to promote generation from alternative sources.	Air pollution, transportation, environmental health.

Topic	Urban Relevance	Environmental Impact	Trip/Study Opportunities	Action Potential	Content Connections
Food	Most food consumed by city people is grown outside the city and transported vast distances to reach urban mouths.	Population and growth pressures diminish agricultural land around cities; shipping food from remote sources is inefficient; foods may contain toxic residues from pesticides, herbicides, or bacteria.	Farmers' markets, regional farms; food warehouse, food packing plant, supermarket.	Bioregional shopping campaign; food awareness education initiatives, eating lower on the food chain campaign; change lunchroom menus to reflect food awareness.	Transportation, energy, open space, environmental health.
Solid Waste	Americans produce 3 to 5 pounds of waste daily – and cities are at a loss for where to put it; much waste ends up in public places as litter.	Landfilling may produce toxic seepage (leachate); incineration contributes to air pollution; recycling may produce toxins, has had difficulty "closing the loop," and may have problems with participation; each solid waste management option is an undesirable land use (i.e., no body wants an incinerator in their backyard).	Landfills, incinerators, recycling facilities, transfer stations, private waste carter facilities.	Start a recycling program in school or neighborhood; education campaign to reduce solid waste (source reduction), community education program to increase participation in municipal recycling programs.	Land use, air pollution, water, environmental health.
Noise	A concentration of noise sources makes cities louder than non urban counterparts: Cars, trucks, airplanes, loud music, trains contribute to the problem.	Excessive noise leads to higher stress levels, possibly nervous and heart disorders, and hearing impairment; students subjected to excessive noise perform worse in school than students working in quiet environments.	Subways, airports, heliports, Department of Health.	Awareness campaign on the health effects of noise, political campaign to have city agencies reduce noise levels on trains, buses, etc.; noise monitoring with decibel meters.	Environmental health, transportation, land use.
Land Use/ Open Spaces/ Housing/ Neighborhoods	Increases in urban populations necessitate additional housing; more urban people have inadequate shelter; development in housing, commerce, and transportation converts soft ground to asphalt or concrete, rendering it useless for agriculture, wildlife habitat, or recreation; plant, animal, and abiotic elements of the urban environment raise awareness of urban dependence on natural systems.	Housing development may lead to wildlife habitat destruction and segmentation, or loss of agricultural lands. Also, soil erosion, water quality and resource use may be affected; loss of green areas leads to lower quality of life, decreased species abundance, and diversity.	Local parks, preserves, greenbelts; new housing developments, old neighborhoods, alternative living arrangements, homeless shelters, development corporations; zoos, botanical garden.	Organize to create gardens and parks on vacant lots; political campaign to control development in ecologically sensitive area, education campaign on ecological value of "unused" land; create model of sustainable urban community; historical exploration and research about neighborhood's past; threatened or endangered species protection campaign, biological inventories and monitoring.	Water, energy, transportation.
Environmental Health	Lead, airborne toxins, asbestos, impure drinking water are widespread risks to city residents, especially the poor.	Environmental contaminants can lead to sickness, difficulty in school, mental retardation.	Health professionals, "green" buildings.	Environmental health fair, lead awareness project, air and water monitoring.	Air pollution, water pollution, transportation.

Master 4

Teaching Scenarios for Teaching About the City Around You

Scenario 1: You are a global studies teacher working with your class on the issue of hunger. How could you help your students relate this issue to their own city?

Urban Relevance: *Hungry people live in this city*

Environmental Twist: *Food production and distribution, where we get our food, energy used in food distribution*

Trip/Study Opportunities: *To shelters and food lines, organizations that provide for homeless and hungry people*

Action Potential: *Coordinate restaurants, dormitories, and hospitals with shelters to use food waste, volunteers to assist*

Content Connections: *Demographics of hunger, nutrition, disease and health care, food production zones, hunger zones, causes of hunger in the U.S.*

Scenario 2: You are a social studies teacher creating a lesson or unit on trade in the development of the American colonies. Using the content matrix, find a link to contemporary urban EE. What topic would you use to draw connections from the colonial period to today?

Urban Relevance _____

Environmental Twist _____

Trip/Study Opportunities _____

Action Potential _____

Content Connections _____

Scenario 3: You are a ninth grade science teacher working on physical science and energy.

Urban Relevance _____

Environmental Twist _____

Trip/Study Opportunities _____

Action Potential _____

Content Connections _____

Scenario 4: You are an art teacher trying to raise students' awareness about function and form.

Urban Relevance _____

Environmental Twist _____

Trip/Study Opportunities _____

Action Potential _____

Content Connections _____

Activity 6

Beautifying and Preserving Open Space

Open spaces offer many benefits to students and residents of urban areas. In this activity, teachers explore the open spaces in their community and discuss projects students could conduct to enhance them.

Objective

To define "open space" and identify actions that will help beautify or preserve an area.

Preparation

Before the activity, familiarize yourself with the local area, with attention to open spaces. Prepare a short list of potential sites for action and some suggestions for types of improvements or preservation actions to attempt there.

Materials

Notepads, pencils, copies of local maps, and possibly cameras

Time

90 minutes

Open spaces such as parks, playgrounds, lots, gardens, and landscaped areas are an essential part of the total environment. Trees, plants, vines, grass, flowers, and vegetables are aesthetically pleasing, provide oxygen, and give comfort and joy to all. Natural elements interact with human-made structures like buildings and streets to produce a total effect on the inhabitants of a particular area.

Yet the open spaces in cities, suburbs, rural places, and wilderness areas are under severe development pressures. Whether it's a 100' by 100' lot used for a high-rise condominium in Miami or thousands of acres in a state recreation area sought for commercial development, government and industry often look at open spaces only as resources to meet the perceived needs of a narrow segment of society.

Besides beautifying the environment, open space projects can educate people about the importance of preserving existing natural areas or creating newly landscaped ones for all built environments.

Motivation

Place a map, or sketch a map, of the community on the chalkboard, table, or overhead. Ask teachers, "What do we mean when we talk about open space?"

Activity

1

Hang a map on a wall of your room and ask the teachers to define "open space." They may point to particular place on the map where there are no roads. Should all of the roadless areas qualify – even cemeteries? With the teachers, consider the following definitions:

- "Open spaces within a built environment include parks, pocket parks, vacant lots, vegetable gardens, landscaped areas, playgrounds, plazas, streets, squares, front yards, golf courses, and cemeteries."
- "In natural areas, open spaces include forests, shoreline areas, wetlands."

2

In small groups, challenge the teachers to list the benefits of open spaces. Here are a few:

- Trees, shrubs, and grass increase aesthetic value.
- Trees cool the immediate area with shade and moisture.
- Plants increase oxygen in the atmosphere and decrease carbon dioxide, reducing the greenhouse effect.
- Trees and shrubs reduce noise by acting as physical buffers along roadsides.
- Open space increases habitat for insects, birds, and small mammals.
- Wetland open space protects the local area from floods.
- Wetlands can reduce water pollution.

3

(optional)

Distribute a map to each small group, and ask them to identify open spaces. Take a vote on which spaces to visit (those they are not familiar with, those in most need of attention, those closest to their school, etc.) and make arrangements to tour them. Ask participants to look for ways to use the space for class activities and for projects their students might do to enhance the value of the open space. Encourage participants to use their cameras to record certain visual aspects of the open spaces.

4

Ask the participants to list possible open space beautification/preservation projects in the built environment or natural areas:

- –Turning vacant lots into pocket parks
- –Planting flowers or vegetables on vacant lots or on rooftops
- –Redesigning a park to meet the needs of those who live there
- –Erecting bird houses or bird feeders
- –Encouraging maintenance workers not to spray certain areas for pests
- –Identifying plants and posting their names
- –Planting and caring for street trees
- –Locating and treating diseased street trees
- –Writing letters or circulating petitions to persuade public officials to keep certain forests, wilderness areas, or wetlands free from development.

5

Identify and record the natural open spaces, wetlands, forest areas in and around your town, village, or city. As a group, mark them on a community map. Then also mark the parks, lawns, plazas, squares, gardens, wall murals, playgrounds, and signs in the built environment of the buildings, streets, and transportation systems of the city or town. Note which areas are open to the public and which are private.

6

Take one of the areas that the group has identified and draw a large schematic map on the blackboard. Have the teachers fill in the space with their observations, putting landmarks in the appropriate spots. Ask them what would make this area "better," (e.g., more trees, benches, window boxes, fewer or better-designed parking spaces, wider sidewalks, roadside flower gardens).

7

Conclude by reminding participants that it is important to beautify neighborhoods, towns, and cities for several reasons: People tend to respond to their surroundings and to other people in a healthier and more effective ways when they are in an aesthetically pleasing environment, and people often take pride in something they do that makes a clear and visual difference. Improving open space is often successful. What locally relevant projects might be feasibly implemented with their student groups?

Adapted from *Training Student Organizers Curriculum*, Michael Zarum, et al., pp. 117-120, with permission from The Council on the Environment of New York City.

Activity 7

City Six Bits

An activity that challenges groups to cooperatively draw the cross section of a city street — under the ground. Information about water and sewer mains, and electricity, gas, and phone cables is included on the Six Bit cards.

Objective

To introduce teachers to the less-than-obvious but vital services that are grounded for urban dwellers below their city streets; to develop cooperative skills.

Materials

Cards made from Master 5 (one set per group of six participants), and pencil for each group

Time

45 minutes

Outline

1

Before the activity, duplicate the cards on Master 5 so that each person will get one card; every six people will have one set of cards. Divide workshop participants into small groups of six and distribute one set, face down, to each group. Also pass out paper and pencil to each group.

2

Instruct the groups to distribute one card to each person, face down. Explain that one card in their group has a task on it; they are to use the information on all the cards to complete the task, and follow all the directions. If groups are having difficulty getting started, explain to them that each card in their group has different information, and although they can't show their card to anyone, they can *read* the cards out loud.

3

Circulate around the room and notice how the groups are proceeding. Answer any questions about pipes and cables, or save them until the whole group can help answer them.

4

When the groups are ready to report on their design, ask them to reconvene. Make clear that each group had the same information, but due to variations in interpretation and unique circumstances in each city block, there could be differences in the designs. Review the drawings and help answer questions they have about the information. You might use the questions on the next page to extend the discussion about the underground.

– How are electrical and telephone cables laid? (They are pulled from a large drum, through one access hole to the next, in short segments.)

– Why are the water mains below the other services, but above the sewer? (In case mains break or pipes leak, you don't want water in the electrical cables, nor sewage in the water mains.)

– What reinforcing would be necessary if a subway went along this block? (Building foundations may need strengthening, along with old water and sewer lines.)

– What might change in the designs if this block were on a slope? (Gravity would cause the water to flow downhill, unless pumps forced it up. Most of the lines would follow the surface topography.)

– What additional mechanism would be necessary if the block were at a low point in the city? (Pumps, located in access holes, would force the sewage, stormwater, and water out of the low point and up to their destinations.)

– What other services might the underground in your city? (Steam pipes are a typical addition.)

Finally, review the process through which participants learned about the city's underground. This cooperative learning exercise might be new to some teachers, and could be something they modified in their classrooms. Point out that they worked together to learn new information, and the interaction was not the source of all the information – they were. There are some additional questions for discussion:

– How did leadership unfold at the beginning of the activity? How did participants decide how to proceed?

– Did everyone participate equally? Why?

– How were decisions made?

– How effectively did the group function? What might have improved efficiency?

– What skills were practiced in completing this task?

Note: Additional information on the underground support systems for a city are found in David Macaulay's *Underground*, published by Houghton Mifflin, Boston, 1976.

Master 5

City Six Bits Cards

1

You may not show this card to anyone in your group.

Task: You and your neighbors wish to plant some trees along your city street. Unfortunately, there are a number of grates, drains, and access holes along your block and you aren't sure where you'll be able to plant the trees. Using the information on the cards, draw a cross section of the block illustrating above and below ground connections to the various services provided. You may need to create more than one drawing using different perspectives to incorporate all the information.

Storm sewer pipes are often 10 times larger than sewer pipes.

Your block has a phone booth that is connected, of course, to the phone cables that run along your block and into each building. Similar cables operate traffic lights and emergency alarms in each building.

Natural gas is piped down your block through metal pipes at least 3 feet below the street.

2

You may not show this card to anyone in your group.

All water lines are buried about 4 feet below the level of soil that typically freezes.

Storm sewers are located below all the other utilities.

An access hole is a round or square room under the sidewalk or street, entered through a round, cast iron lid. It allows people to work on the pipes, ducts, and valves and pumps that operate the water, sewer, electrical, or steam systems in the city. Different access holes are required for each system.

The natural gas distribution network also uses valve boxes to control the flow of gas, and checkpoints to regulate the pressure in the line, but your block doesn't have any.

3

You may not show this card to anyone in your group.

A separate high pressure water pipeline is maintained to all fire hydrants which enables a large quantity of water to be immediately available. Two hydrants are on your block.

Sewer pipes are large, clay or concrete pipes.

Storm sewers drain water from rain and snow storms out of the city and often directly to a river.

Telephone cables run along your block — big bundles of wires located about 3 feet below the street.

Transformers are located in underground rooms called vaults.

4

You may not show this card to anyone in your group.

A submain carries water along this block from the main to branch lines that hook up to each building's plumbing system.

Sewer pipes typically rely on gravity to feed the wastewater to the wastewater treatment plant, and therefore are laid down on a slope.

Electricity is carried through heavy duty cables in steel pipes located several feet below the street and above the water lines.

Underground telephone cables are often laid parallel to and at the same depth as the electrical cables. They also have access holes for pulling, connecting, and feeding cables into buildings and phone booths.

48

5

You may not show this card to anyone in your group.

Halfway down the block, a valve on the water submain allows for this section of the water line to be shut off and repaired. The valve is reached by opening a small round cast iron lid in the sidewalk. A long gate key is inserted through the lid, into the valve box, where the valve can be turned to shut the gate.

A sewer pipe collects wastewater from each building on this street.

The storm drain inlet opens into a catch basin below the sidewalk — a rectangular storage tank that connects to the storm sewer.

Your block has a vault for the electrical ducts and transformer. It is a rectangular concrete box below the sidewalk, and is covered by an open ventilation grate near the building.

In harsh winters, the soil freezes to a depth of 18 inches in your region.

6

You may not show this card to anyone in your group.

Regular water lines are designed to carry water from the city reservoirs to homes and businesses. A constant pressure is maintained in the pipes by continuous pumping.

Sewer pipes are well below the water pipes, often 10 feet below the street.

Electrical cables run to transformers where the voltage is reduced to match the needs of the buildings on the block.

Your block has an inlet to the storm drain — a horizontal hole in the curb covered by an open iron grate.

49

Activity 8 Tour de Buildings

Guidelines for a field trip through the city to see the major features of the landscape. All grade levels.

Objective

To acquaint workshop participants with the types of architecture and building design they will find in their city. To create connections from the math, science, history, and technology curricula to the urban environment.

Materials

Drawing materials for each participant

Time

To be determined depending on your district's procedures

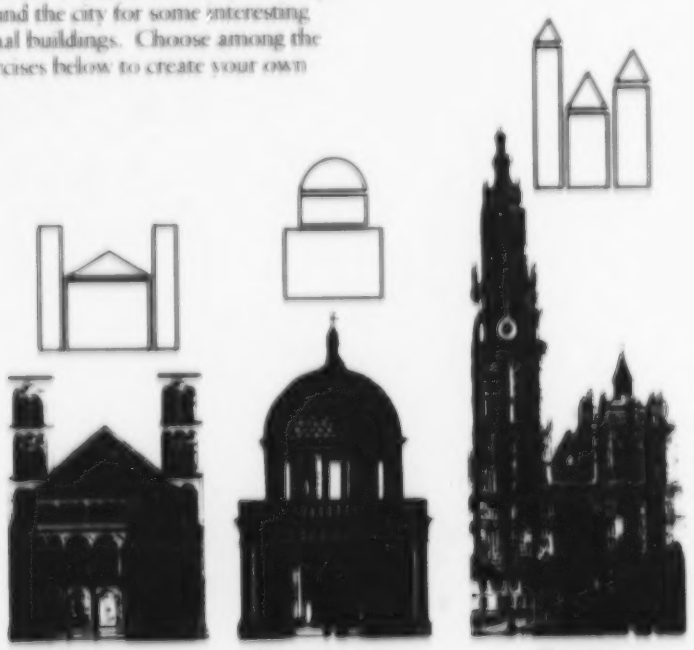
Outline

You may wish to contact a local historian, geologist, architect, or city planner to lead your city tour. If such resource people are not available for your field trip, they might join your workshop at another time or offer materials to workshop participants.

1

If a guide is not available for a city field trip, scout around the city for some interesting and unusual buildings. Choose among the list of exercises below to create your own field trip.

a. Sketch three different buildings, reducing them to basic geometric shapes, as shown here. Ask teachers how the shapes influence the way the buildings look (some are squat, some are tall and lean, some are square).



ROMANESQUE RENAISSANCE GOTHIC

b. Look for patterns on buildings, and similarities among different buildings in a neighborhood. Placement of windows, arches, columns, ledges, chimneys, balconies, and shutters often is used to create repetitive design.

c. Compare a single feature among several buildings. For example, how are doorways treated in a variety of buildings? Windows? Rooftops? Entrances? Although each door, for example, performs the same function, why are they different? What else do they bring to the building?

d. Analyze several buildings for symmetry in shape. Where do asymmetrical shapes balance each other in the building design? In what other ways might the architect have designed the building to achieve a similar or different look?

e. Ask everyone to choose their favorite building and to draw it. When you have returned to the workshop site, categorize the drawings according to their function (residential, civic, commercial, ecclesiastical). Within each category, sort the buildings into common characteristics and list all characteristics that make up each category.

f. Obtain a blueprint of a building on your city tour and use it to help participants understand how a building is constructed. Encourage teachers to try their hand at drawing a blueprint of a building with which they are familiar.

g. Tour an historic building that has been preserved. What was it first designed to be? Why was it preserved? When was it constructed? Did prominent people live there? How did the preservation change the original building?

Ideas presented here are adapted and used with permission from The American Institute of Architects, 1735 New York Ave., N.W., Washington, DC 20006.

Activity 9

Why Buildings Stand Up

A series of challenges and investigations to understand the physics of building construction. Appropriate for elementary and middle school.

Objective

To establish the importance of the built environment in the city; to help workshop participants understand and feel more comfortable in the urban environment.

Materials

Paper and coins, basketball

Time

15-45 minutes

If your group were interested in the ecology of rainforests, you might begin by looking at trees, a dominant element of that ecosystem. Similarly, you might set the sense of place in an urban EE workshop by looking at buildings.

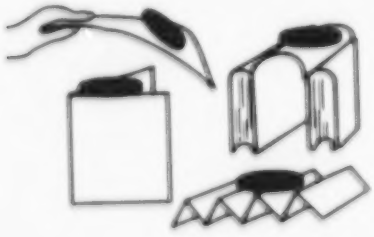
Outline

1

Introduce this topic by reminding participants that buildings are a balance between two forces: tension and compression, like your two hands pushing against each other (compression) or pulling away from each other (tension). Standing in a circle, with arms linked, participants can feel the forces of tension that keep the circle whole as they lean outward, and the force of compression as they scrunch together. Compression causes the material to become shorter (as when you press on both ends of a sponge), and tension makes things longer and thinner (as when you pull on a rubber band). Even the wood and concrete in buildings are subject to these forces, and some construction materials do a better job of withstanding tension and compression than others. If the pressure becomes too great, the beams could crack and buckle or break.

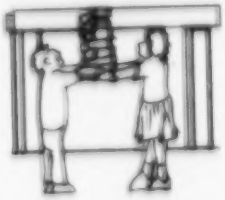
2

A structure's shape can make it stronger, because of the different ways the material will react to tension and compression. Demonstrate that one cannot balance a penny on a piece of paper held by one edge — the paper bends and the penny slides off. It has no stiffness to carry the weight of the penny. Challenge each group of teachers to change the paper or the way the paper is supported to balance the penny. Possible solutions are shown below. If time allows, give participants tagboard.



3

What is the strongest way to span a space? Ask two people to stand up, hold their arms out in front of them, and demonstrate different ways of connecting their hands so they can support weight (several books) on their arms. Neither touching fingertips nor locking fingers is as effective as grabbing elbows. Triangular trusses are often used for short bridges (people can face each other with toes touching, grabbing elbows, arms straight and leaning outward).



4

Some shapes are common in architectural design. They are used repeatedly because they balance forces of compression and tension to sustain the shape. A dome is a good example of a stable, structurally sound shape. Give six people a basketball and ask them to create a standing dome. (It works well to stand in a circle, spreading feet apart to touch the next person's feet and leaning in to support the ball above a point in the center of the circle.) Invite the groups to create a model of an arch with flying buttresses and footings!

5

Your city has many examples of shapes in the local buildings and bridges. Domes, arches, trusses, columns, beams, and suspension cables can, no doubt, be found. Challenge the group to identify where the compression and tension forces are acting to support the structure.

Used and adapted with permission from The American Institute of Architects, 1735 New York Ave., N.W., Washington, DC 20006.

Additional information and activity ideas are available in their publication, *"Why Do Buildings Stand Up?"*

IX

Resources

Nature in the City

Education Materials

City Kid's Field Guide. Ethan Herberman. 1989. New York: Simon and Schuster. 48 pp. Fascinating information about urban wildlife for elementary age, great graphics and photos. Available from:

Simon & Schuster
200 Old Tappan Road
Old Tappan, NJ 07675
℡ 800 223-2348

Urban Wildlife Managers Notebook. National Institute for Urban Wildlife. Series of 18 information bulletins for the layperson. $1 each. A single issue is discussed in each bulletin, e.g., butterflies in your garden, wildlife gardens. See address under "Organizations".

Wildlife Habitat Conservation Teacher's Pack Series. National Institute for Urban Wildlife. For grades 4-7, $7 a pack, includes data sheets, lessons, worksheets. Eleven titles in series, two focused on urban: "urban areas" and "developed lands." See address under "Organizations".

City Safaris. Carolyn Shaffer and Erica Fielder. 1987. San Francisco: Sierra Club Books. 185 pp. Nicely formatted, games, worksheets and projects to explore cities and towns. Available from:

Sierra Club Books
730 Polk St.
San Francisco, CA 94109
℡ 415 923-5600

Ten-Minute Field Trips: Using School Grounds for Environmental Studies. Helen Ross Russell. 1990. Washington: National Science Teachers Association. 163 pp. Tried and trusted guide to exploring the immediate environs around your school.

NSTA
Attn: Sandy Aldridge
1840 Wilson Blvd.
Arlington, VA 22001
℡ 703 243-7100

Organizations

States of Washington, Oregon, Iowa, Arizona, Kansas, Florida, Maryland have urban wildlife programs. Check with your state wildlife agency to see if they have an urban biologist on staff.

NAAEE-VINE Network. VINE (Volunteer-led Investigations of Neighborhood Ecology) offers suggestions for studying nature in urban areas and how to establish a corps of volunteer instructors for summer day camps.

NAAEE
1255 23rd St., NW, Suite 400
Washington, D.C. 20037
℡ 202 884-8912

National Institute for Urban Wildlife. Private nonprofit organization focused on urban areas. Has publication list, some technical, scientific, also EE, conservation education materials. Small library. Sponsors national symposium on urban wildlife every four years. Urban Wildlife Sanctuary Program for school grounds. Write for list of publications.

National Institute for Urban Wildlife
P.O. Box 3015
Shepardstown, WV 25443
℡ 304 274-0205

Project Pigeon Watch. A nationwide program established by the Cornell Laboratory of Ornithology to help youngsters gather data on pigeon feeding and mating behavior.

Cornell Laboratory of Ornithology
159 Sapsucker Woods Road
Ithaca, NY 14850
℡ 800 843-BIRD

Backyard Wildlife Habitat Program. A National Wildlife Federation program will place your site on an official list and provide a certificate. Also good for advice.

National Wildlife Federation
1400 Sixteenth St., NW
Washington, D.C. 20036-2266
℡ 202 797-6800

Literature

The City in History, Its Origin, Its Transformation and Its Prospects. Lewis Mumford. 1961. New York: Harcourt, Brace, Jovanovich. This classic historical work offers detailed perspective on the past and future roles of cities. Available from:

Harcourt, Brace, Jovanovich
6277 Seaharbor Dr.
Orlando, FL 32887
✆ 800 782-4479

Underground. David Macaulay. 1976. Boston: Houghton Mifflin Co. $8.95. Excellent illustrations and explanations of the support services for a city, from foundations and pilings to sewer pipes and phone cables. Available from:

Houghton Mifflin Co.
Wayside Rd.
Burlington, MA 01803
✆ 800 225-3362

Education Materials

Architecture in Education – A Resource of Imaginative Ideas and Tested Activities. Marcie Abhau, et. al., eds. 1986. Philadelphia: Foundation for Architecture, 192 pp., $30. One of the best resources for teaching about the built environment, quick reference format, drawings, highly usable ideas. For teachers of all grade levels. Available from:

Foundation for Architecture in
Philadelphia
1 Penn Center at Suburban Station,
Suite 1165
Philadelphia, PA 19103
✆ 215 569-3187

Art and the Built Environment: A Teacher's Approach. Eileen Adams and Colin Ward. 1982. Longman Group, 160 pp. Emphasis on buildings and their environmental context, large format handbook, good pictures and ample illustrations of students' work. Useful for all grade levels. Available from:

Longman House
Burnt Mill, Harlow
Essex CM20 2JE
United Kingdom

Walk Around the Block. Center for Understanding the Built Environment. 1992. CUBE's curriculum includes a workbook for students and teachers to understand city functioning. Available from:

CUBE
5328 W. 67 St.
Prairie Village, KS 66208
✆ 913 262-0691

Sourcebook II. American Institute of Architects. Washington, D.C., 160 pp. $15 plus $3 shipping and handling. A compendium of information about existing educational programs, teaching materials, people and organizations involved in EE, with an emphasis on enhancing perception of surroundings and improving environmental decision-making. Available from:

The American Institute of Architects
P.O. Box 60
Williston, VT 05495-0060
✆ 800 365-2724

Transformations: Process and Theory – A Curriculum Guide to Creative Development. Doreen Nelson, 1984. Center for City Building Educational Programs, 218 pp., $17.95. This guide provides foundations for how a city works, with lots of activities and documentation of Nelson's vast experiences as an architect and educator. Available from:

Center for City Building
Educational Programs
2210 Wilshire Blvd., #303
Santa Monica, CA 90403
✆ 310 471-0090

Walking, A Realistic Approach to Environmental Education. Michael Zamm. 1977. Council on the Environment of New York City, 39 pp. $2. Step-by-step instructions for exploring your local area. Available from:

Council on the Environment of
New York City
51 Chambers St., Room 228
New York, NY 10007
✆ 212 788-7932

Organizations

Municipal, state, and federal versions of transportation, sanitation, health, environment, agriculture, and parks and recreation departments provide information, speakers, trips, and program materials (usually free of charge).

American Institute of Architects. AIA has 19 regional coordinators around the U.S. that may serve as valuable resources and also has Learning by Design, a system of resources with practical activities for students. For more information contact Alan R. Sandler, Senior Director, Education Programs.

1735 New York Avenue, NW
Washington, D.C. 20006
℡ 202 626-7500

Boston Children's Museum houses fun-filled participatory exhibits for children of all ages. Areas of interest range from culture and the arts to science and natural history.

300 Congress St.
Boston, MA 02210
℡ 617 426-8855

Design Education Resource Library at Cooper-Hewitt. Contact Dorothy Dunn or Kerry MacIntosh for books, maps, slides, journals, brochures, videos, and instructional materials relating to all areas of design—architecture, communication arts and graphic design, landscape design, product design, and urban planning.

Smithsonian Institution's National
Museum of Design
2 E. 91 St.
New York, NY 10128
℡ 212 860-6871 ext. 6977

Oakland Museum has collections, exhibitions, educational programs and is initiating a three-year community project, *Urban Spaces NEED Leadership Project* (Neighborhood Environmental Education and Discovery).

Attn. Sandy Brecht
1000 Oak St.
Oakland, CA 94607
℡ 510 238-3884

Toronto Urban Studies Center

Attn. Lorraine Clarkson
51 Larchmont Ave.
Toronto M4M 2Y6, Canada
℡ 416 393-0661

Service/Action

Education Materials

Greening Common Cities: A Tree Planting Handbook. Gary Moll and Stanley Young, 1992. The Living Planet Press, 126 pp. Broad perspective on multiple environmental issues. How to effectively implement tree planting campaign. Available from:

Living Planet Press
2940 Newark St., NW
Washington, D.C. 20008

Teaming Student Organizers Curriculum. Michael Zamm, Robert Ortner, Beverly DeAngelis, 1990. Council on the Environment of New York City, 239 pp. $15.00. Available from:

Council on the Environment of
New York City
51 Chambers St., Rm. 228
New York, NY 10007
℡ 212 788-7932.

E2: Environment and Education (formerly the Earth Time Project), as a curriculum approach for middle and senior high school students to investigate the school environment and make real changes toward a sustainable future. Modules include the following topics: water conservation, energy conservation, landscape and gardens, waste management and source reduction, school supplies and maintenance, and food systems. Available from:

E2
881 Alma Real Drive, Suite 118
Pacific Palisades, CA 90272
℡ 310 573-9608

Organizations

National Wildlife Federation. NWF's program for high school sophomores, *Earth Tomorrow: An Urban Challenge*, focuses on the positive aspects of the urban environment and involves students in environmental projects in their schools and communities.

1400 Sixteenth St., NW
Washington, D.C. 20036-2266
℡ 202 797-6800

Chicago Academy of Sciences concentrates on the history and ecology of the Midwest and Great Lakes region. The primary thrust of its programs is urban environmental education and teacher training.

Attn. Carol Fialkowski
2001 N. Clark St.
Chicago, IL 60614
℡ 312 549-0449

Council on the Environment of New York City, a privately funded citizens' organization in the Office of the Mayor, CENYC promotes environmental awareness among New Yorkers and develops solutions to environmental problems. CENYC offers four programs: Open Space Greening, Greenmarket - a series of farmers markets, Environmental Education, and the Office Waste Prevention and Recycling Source.

Attn. Michael Zamm
51 Chambers St., Room 228
New York, NY 10007
℡ 212 788-7932

Jefferson County Public Schools Center for EE offers a variety of EE programs including a residential project.

Attn. David Wicks
546 S. First St.
Louisville, KY 40202
℡ 502 473-3295 ext. 3437

[1] Ted Sizer, *Horace's Compromise, The Dilemma of the American High School*, Houghton Mifflin, Boston, 1985. The situation in the urban high school is reflective of conditions in U.S. high schools overall. This book offers an in-depth discussion of high school problems.

[2] "1994 Annual City and County Databook." Bernham Press, Lanham, MD.

[3] Belinda Williams and Ellen Newcombe, "Building on the Strengths of Urban Learners," *Educational Leadership*, vol. 51 no. 8 May 1994, pp. 75-78.

[4] Alex Molnar, "City Schools Under Attack," *Educational Leadership*, vol. 51 no. 8 May 1994, p. 59.

[5] According to Dr. Roger Hart (City University of New York, Environmental Psychology), environmental educators have tended to promote their own middle class, often anti-urban, agendas when working with urban groups. The result of this top-down approach (and other factors) has been an emphasis on nature in the city, rather than the more complex social-environmental problems city residents face, such as unfair distribution of environmental burdens. Urban EE practitioners must become more sensitive to the real needs of urban audiences, and if those include nature study, then so be it. But if that need includes more basic items, such as health, personal safety and housing, we should be ready to accept these as "environmental" agendas.

[6] Edward Allen, *How Buildings Work, The Natural Order of Architecture*, Oxford University Press, New York, 1980.

[7] Approaches within the service/action strand of urban EE vary widely; see "Using Community Resources" in the *Workshop Resource Manual*. Aside from Chicago's EcoCat Program, another noteworthy urban EE service/action program is the Council on the Environment of New York City's Training Student Organizers program, which, since 1976, has trained thousands of high school youth to organize environmental improvement projects in their schools, neighborhoods, and homes.

[8] Ideas in the section "What Urban Kids Need to Know" are adapted from an interview with Talbert Spence in the Natural Science for Youth Foundation's 1988 newsletter.

[9] Among urban African-American elementary students, important issues echoed those articulated by high school students, namely drugs, guns, and fighting, according to preliminary findings of a Howard University study titled "Development of Curriculum and Artistic Expression and Training Instruments for Minorities in the Environment," July 1993.

[10] Karen Hollweg, *NAAEE's Environmental Communicator*, February 1993. VINE, 1255 23rd Street N.W., Suite 400, Washington, DC 20037.

[11] David Hawkins, "Statement on Environmental Education." Statement given to the U.S. Congress Senate Committee on Labor and Public Welfare, Subcommittee on Education, Environmental Quality Education Act Hearings, 91st Congress, Second Session on S. 3151, S. 3237, and S. 3809, May 19-20, 1970.

N C E E T
National Consortium for
Environmental Education
and Training

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